Total reserves of thorium

†443. SHRI SHREEGOPAL VYAS:
SHRI BALAVANT *ALIAS* BAL APTE:

Will the PRIME MINISTER be pleased to state:

(a) the experiments carried out in the direction of producing atomic energy from thorium and the possibilities thereof;

(b) the names of the States and the number of reserves found therein;

(c) whether it is also available in the sea between India and Sri Lanka;

(d) the efforts being made to preserve and utilize them; and

(e) the percentage of atomic energy that could be met out of the total available reserves of thorium?

THE MINISTER OF STATE IN THE PRIME MINISTER'S OFFICE (SHRI PRITHVIRAJ CHAVAN): (a) Thorium plays a pivotal role in Indian Nuclear power programme. Right from the inception of Indian nuclear power programme, work has been carried on all aspects of thorium utilisation *viz.*, mining and extraction, fuel fabrication, irradiation in reactors, reprocessing, re-fabrication and setting up of reactors using fissile uranium derived from Thorium. Studies are also underway for utilisation of thorium in different types of reactors.

Thorium fuel fabrication through powder pellet route has been well established. Few tons of fuel has been made for CIRUS and Dhruva, for PHWR and for blanket assemblies for FBTR. Few pins have been fabricated using mixed oxides of (Th-Pu) for irradiation in research reactors.

Thoria bundles have been used in the initial cores of PHWR. The irradiation experience of thoria fuel in CIRUS, Dhruva, PHWRs and test irradiations is satisfactory.

The thoria pins of CIRUS have been reprocessed to obtain U233. The recovered U233 has been used as fuel for critical facilities at Trombay and for KAMINI reactor at Kalpakkam. The Post Irradiation Examination of the thoria bundle irradiated in PHWR has also been carried out for validation of theoretical analyses.

Studies have been carried out regarding use of thorium in different types of reactors with respect to fuel management, reactor control and fuel utilisation.

To, accelerate thorium utilisation, BARC has designed a 300 MWe Advanced Heavy Water Reactor (AHWR). This reactor will demonstrate various aspects of thorium fuel technology. The AHWR was included as a case study in IAEA's INPRO project on innovative reactor and fuel cycles.

(b) AMD has identified 10.21 million tonnes of Thorium mineral monazite in different States as given below:

†Original notice of the question was received in Hindi.

State	* Monazite Resources (in million tonnes)
Andhra Pradesh	3.73
Jharkhand & West Bengal	1.45
Kerala	1.37
Tamil Nadu	1.84
Orissa	1.82
TOTAL:	*10.21

* inclusive of indicated, inferred and speculative reserves. Monazite contains about 10% of Thorium Oxide.

(c) DAE undertakes investigations for onshore beach sand mineral deposits. The marine wing of Geological Survey of India has systematically surveyed the seabed sector between India and Srilanka within Idian jurisdiction. Presence of certain placer minerals in seabed sediments in low to moderate quantity has been recorded by GSI. However, the presence of thorium bearing mineral like monazite is negligible in such placer mineral assemblage.

(d) Monazite is the main source from which thorium is extracted. The Department is giving necessary assistance to the Indian Rare Earths Limited, a Public Sector Undertaking under the Department, for processing of the Monazite for extraction of thorium and its storage in a retrievable manner.

(e) Energy potential available in our Thorium reserves is huge. Percentage of atomic energy that could be met from Thorium would depend on nuclear generation capacity at which transition is made from second stage involving Fast Breeder Reactors to the third stage of Thorium Utilisation in the sequential implementation of our three stage programme.

Crisis of nuclear scientists in the country

†444. SHRI SURENDRA LATH: Will the PRIME MINISTER be pleased to state:

(a) whether it is a fact that Multinational companies associated with the production of nuclear energy are becoming active in the country;

(b) whether it is also a fact that these companies are offering employment to the excellent scientists of the country with attractive pay and perks and as a result of which there is a crisis of nuclear scientists in the country;

(c) whether Government are formulating any scheme in this regard;

(d) whether multinational companies in the field of nuclear energy would affect country's security in any way; and

(e) if so, whether Government have formulated any scheme in this regard?

†Original notice of the question was received in Hindi.